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CV POWER PROJECTION:

THE "NIGHT" STUFF

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by

Richard E. Clayton

Commander, USN

A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of
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The primary mission of naval aviation is power projection. Over the years, in order to successfully conduct this mission, the threats encountered have driven tactical air to the night, low altitude environment. Is this still a viable task for the Carrier Battle Group (CVBG) and is it still necessary to support the operational commander? Will lessons learned from Desert Storm indicate a need to redefine the role of the CVBG and give the night interdiction mission entirely to the Air Force? A brief review of the development of night systems is conducted, current capabilities are discussed and a comparison of Navy and Air Force systems is presented. The combined use of night vision goggles with state-of-the-art forward looking infrared (FLIR) systems in Navy F/A-18s and A-6s is more flexible and provides more capability in some scenarios and environmental conditions than is available from the Air Force FLIR only systems. The lessons learned from Desert Storm are numerous and important, but can not be applied to all future conflicts. Geography made it very difficult for naval aviation in the war against Iraq and the next conflict may find the Air Force facing a similar problem. This paper contends there is still a need for improving our night strike capability and a need for both Navy and Air Force in future joint operations.



TABLE OF CONTENTS

	PAGE
ABSTRACT	11
INTRODUCTION	1
IMPROVEMENTS IN NIGHT TECHNOLOGY	3
DEVELOPMENTS IN TACTICAL AVIATION	5
CAPABILITIES VS LIMITATIONS	11
DESERT STORM	13
JOINT OPERATIONS	15
CONCLUSION	17
NOTES	19
BIBLIOGRAPHY	21

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INTRODUCTION

The Air Force calls it offensive air support (OAS) or battlefield air interdiction (BAI), while the Navy simply calls it power projection. Whatever its name, the ability of a United States Navy Carrier Battle Force (CVBF) or Battle Group (CVBG) to conduct sustained night strike missions in a scenario below the level of conventional warfare (either in the low or medium threat environment) has not been seriously questioned for many years. From the time aviation forces first gained the technology to fly safely and effectively at night, there has been a massive effort across the aviation spectrum to exploit the night environment as a safe haven in which to operate. Naval aviation has been no exception. However, I believe the Navy may presently be faced with a critical crossroads and one question that could arise from the recent war in the Persian Gulf might be whether night power projection from either a Carrier Battle Group or Battle Force remains necessary and critical as a viable means of supporting the National Military Strategy. Does the Navy offer as much, or more importantly, anything at all above and beyond what the United States Air Force can bring to the present day battlefield?

In an effort to answer that question, this paper will first briefly discuss the development of current night systems available, review our current capabilities and then compare some of the advantages and disadvantages of each.



All of the armed services that field aviation units are charged with supporting the overall aviation effort to varying degrees and in an assortment of ways. JCS Pub O-2 assigns Navy with the following among its numerous primary functions; "Provide air support essential for naval operations." The following two aviation related collateral functions are also directed; "Conduct close air and naval support for land operations," and "Be prepared to participate in the overall air and space effort, as directed."¹ In order to effectively conduct these missions, it has become even more important during the last several years, as a result of continual improvements in the threat systems encountered, for aviation squadrons to be able to carry out combat air operations at night. This capability has had a dramatic affect on U.S. war fighting strategy and most of the contingency plans now are designed to exploit the significant night environment advantage we enjoy. This fact alone has in turn also had a substantial impact on the new military systems and hardware currently in use and those which are being developed and procured for the future.

While aviation units have proven capable of operating successfully at night throughout a wide spectrum of scenarios and against a wide assortment of potential adversaries, it is frequently argued that we may be losing some of the substantial night time advantage we have long enjoyed. The argument is often developed that there is very little value anymore in night operations since the sanctuary has been



negated to a large degree by today's state-of-the-art radars and other sensors. However, the recent Desert Storm operations in Iraq and throughout the Middle East, where day time temperatures frequently reached a blistering 120 degrees, proved otherwise, I believe. They reconfirmed that night operations are still much to our advantage and will remain a necessity in many parts of the world, if for no other reason than to minimize the toll on maintenance troops and sensitive support equipment that is encountered during daylight operations.² Of primary consideration, however, is the fact that if ground combat forces have to operate routinely at night in order to survive on the modern day battlefield, their air support will be required in the same environment to a large degree as well.

IMPROVEMENTS IN NIGHT TECHNOLOGY

Even though radar and other similar types of innovative improvements had been in use for many years, one of the first true breakthroughs in the night environment that would eventually lead to a twenty four hour battlefield came during the Korean War when the first night vision device was mounted on the M1-D during sniper operations.³ That first "system" was nothing more than an infrared tube which transmitted a light that was invisible to the human eye, but which was detectable with a set of infrared goggles. From purely a military standpoint, that first crude night vision device left much to be desired because the system was not entirely



passive, making it easily detected by anyone with goggles and therefore a very dangerous situation was created for the user. It was, however, instrumental in opening the door for the very first time to a new avenue that would eventually be able to revolutionize air warfare.

The successive generations of passive night vision devices have overcome, to a large degree, many of the limitations and most of the drawbacks initially encountered (e.g., excessive size and weight, battery power requirements, and the loss of vision after every shot fired). The new technology that emerged during the late 1960s electronic revolution had a dramatic influence on the avenues which users of night vision devices were able to pursue during the next few years.⁴

Coincident with those substantial technological advances was the end of the Vietnam war. Many of the lessons learned from that conflict, as well as the published results of an extensive U.S. Army study, indicated that aircraft would be forced to routinely operate in very high threat environments during future conflicts. In order to be capable of this type of operation, it was also determined that accurate low level night navigation using some type of night vision system would be absolutely essential.⁵ The study led directly to the formation of a special aviation unit which, during the course of the next several years, was responsible for development and testing of most of the Army's night time aviation doctrine, tactics and equipment. Their efforts were equally



instrumental to the other services' aviation forces in that they took Generation II night vision goggles (NVGs), designed originally for tank and truck drivers, modified them for airborne use, then tested and annotated their numerous shortcomings. This subsequently enabled the development of the present day state-of-the-art Aviators' Night Vision Imaging System Six (ANVIS-6) NVGs, which make much better use of both the infrared light spectrum and the process of image intensification, making them approximately three times more sensitive than older generation goggles.⁶ These vast improvements have enabled the NVGs that are being used today in most Navy and Marine Corps aviation communities to be safely used for flying on starlight only nights and even overcast nights to some degree.⁷

DEVELOPMENTS IN TACTICAL AVIATION

While the Army led the way in developing improvements to the night vision systems, the tactical aviation communities were also under extreme pressure to improve their own important capabilities, although along totally different avenues. In some cases and for many of the same justifiable reasons, they were also driven to the low altitude night environment by the forces and threats that had earlier so dramatically influenced the helicopter community. One must freely admit that even though the use of air assets in the night time role was becoming more common all the time, their actual impact at night in the air-to-ground mission remained



extremely limited even through the end of the Korean War because of the still primitive state of systems available. Except for the first extensive use of flares for night air interdiction operations, which did demonstrate some potential, the air war remained primarily a day time affair and tactical aircraft were generally no better able to perform night operations during this time frame than they had been at the end of World War II.⁸

The resultant efforts by the tactical aircraft (TACAIR) communities to develop a viable night strike capability became critical because of the emerging need to deny the enemy any ability to use darkness as his sanctuary. It could also minimize the threat from a growing number of air defense systems, such as optically guided surface-to-air missiles (SAMs), anti-aircraft artillery and early generation fighters/interceptors that did not yet have any look-down, shoot-down capability.⁹ The eight year time span that encompassed the Vietnam War, while generally a period of dramatic technology improvements, was not one which resulted in that many truly revolutionary new ideas being introduced for employment of TACAIR at the operational or theater levels. The most common use of air assets in the night interdiction role remained very similar to the previous application during Korea in the 1950s. A large majority of these night operations were conducted in Laos and South Vietnam, where the relatively low threat environment enabled the same circle-the-wagon type of close air support (CAS)



effort, using flares and in most all cases airborne forward air controllers (FACs) as well

In North Vietnam, where the surface to air threat to airborne assets was substantially greater, night air-to-ground operations saw the introduction of a new capability which for the most part was limited to Air Force F-111 and Navy A-6 aircraft.¹⁰ Both proved to be relatively effective in this new single ship, low altitude mission and relied primarily on terrain following (TF) and terrain avoidance (TA) radar for some degree of freedom from the threat during the enroute phase of night missions and then a radar mapping mode for attacking the target. Except for some limited capability of the A-6 to find moving targets with its Automatic Moving Target Indicator (AMTI) system, large radar significant fixed targets were the only ones placed at risk by these newer night systems. It should also be remembered that no capability existed at all to conduct close air support in such a high threat night environment during that time frame.

In spite of the limited degree of success these systems provided in the low altitude, night regime, the growing effectiveness of SAM defenses and other sensors demanded development of some type of better, more passive means of ingress. More flexible and accurate systems for use during the attack phase were also desired and since they were becoming available through technology developments, they just needed to be converted for use by TACAIR.¹¹



These highly improved systems included Forward Looking Infrared (FLIR) and Low-Light-Television (LLTV), among others. During extensive testing programs that were conducted throughout this time period, limitations developed with the LLTV systems which could not be overcome and even though they were able to extend the daylight flying into predawn, as well as after dusk to some degree, they could not provide the 24 hour operations in the low altitude, high speed flight regime that was deemed necessary.¹² For that reason, LLTV systems gave way to FLIR almost exclusively for low altitude, high speed operations. Like the simultaneous method that was being used to first introduce NVGs, FLIR systems were also initially used by ground forces, with the first airborne application in an operational theater by USAF AC-130 Gunships in Vietnam during 1967, followed shortly with FLIR introduction to the TACAIR communities through Navy A-6s and A-7s.¹³

Some of the major drawbacks prevalent in the early systems have been eliminated to a large degree with the latest technology FLIRs, which have much wider fields of view and larger pilot Heads Up Display (HUD) units incorporated. As a result, aircrew disorientation in the low altitude night environment has been reduced substantially, but unfortunately not eliminated all together. The current top-of-the-line night attack systems fielded by the Navy and Air Force were arrived at using totally different, but effective avenues. Air Force work with night vision devices has surprisingly



remained extremely limited, except for improvements to the basic FLIR. They have shown very little interest in also incorporating the use of NVGs with FLIR and their approach has primarily been one of further improvements in two major systems, the first being the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) system.¹⁴

Carried by F-16 and F-15E aircraft, LANTIRN consists of two pods mounted externally on the fuselage - a navigation pod and a targeting pod - permitting standard daytime air-to-ground attack techniques to be used at night. The navigation pod contains a terrain-following radar and a forward-looking infrared sensor. The targeting pod comprises a dual field-of-view FLIR tailored to target detection and lock-on, a target tracker, a boresight correlator for automatic missile handoff, and a laser designator and rangefinder.¹⁵

The second Air Force FLIR system, the Low Altitude Night Attack (LANA) system on the Air Force Reserve A-7s was also extensively upgraded and improved.¹⁶ The LANTIRN system in particular has demonstrated most impressive capabilities and is generally considered by many experts to be the best stand-alone FLIR currently being used anywhere in the world.

On the other hand, the Navy, working very closely with the Marine Corps, has taken a completely different approach to solving the same difficult night attack problem. The Navy and Marine Corps approach is one that incorporates the combined use of both NVGs and FLIR in all their F/A-18s and A-6s, as well as in the Marine Corps AV-8s. The F/A-18



community is at the leading edge of the effort being put forth by the naval service in this regard. The F/A-18 aircraft contains a list of equipment that gives it a truly impressive night capability: targeting FLIR for identifying and attacking targets, navigation FLIR pod, raster HUD, color navigation map, laser target detector/ranger (LDT/R) for precision delivery of smart weapons, extremely accurate navigation/weapons delivery inertial system and the APG-65 radar that is equally capable at picking out air-to-air as well as air-to-ground targets.¹⁷

The really unique feature found in the Navy's system, and a key ingredient in the newest production aircraft, is the total compatibility for the pilot to use NVGs in conjunction with FLIR. This offers a dramatic, enhanced advantage in many cases and even greater flexibility than the LANTIRN or LANA systems under a wide variety of scenarios and environmental conditions. Every F/A-18 Hornet delivered subsequent to the Production Lot XIIIs that started to be received in October 1989 have been these new night attack models with cockpit lighting specifically designed to be compatible with NVGs.¹⁸

While the full range of options using this unique capability are still being developed, the total system package has already proven that it can easily provide the situational awareness necessary for aggressive nighttime maneuvering at low altitude and also that flights with NVGs and FLIR are not merely compatible, they are also extremely



complementary.¹⁸ Contrary to operations with FLIR alone, NVGs also allow multiple aircraft flights to conduct section or division tactics in the navigation and weapon delivery phases, with an equivalent increase to mutual support and firepower concentration in the target area.

CAPABILITIES VS LIMITATIONS

There is little doubt that current night vision systems, including FLIR, NVGs or both, do in fact allow a great deal of freedom and give the aircrew a superb capability to conduct strikes in what otherwise would be a more dangerous, less permissive night environment. However, both the Air Force and naval aviation forces still face some substantial limitations. Despite the existence of many types of electronic vision aids, there is still no truly complete substitute for the human eye. And like the eye itself, NVGs and FLIR can also be made relatively useless during adverse weather conditions. For that reason, it should be remembered that some areas of the world and some seasons of the year will simply not be conducive to night VFR operations using any of these new systems. We will find it necessary to live with this limitation while planning any future operation.

Almost all of the effort expended in upgrading U.S. night capability over the years has been in the area of overland navigation and air-to-ground weapons delivery. While not completed yet, much of the knowledge gained from this extensive work can be easily transferred to a war-at-sea



(WAS) scenario, but most likely not so efficiently converted to the air-to-air role. Except for the Non-Cooperative Target Recognition (NCTR) feature of the air-to-air radars in the F/A-18 and the F-15, we have very limited capability to see and identify a potential air threat at night. None of the U.S. front-line fighters currently have night vision systems installed, nor is there any serious effort underway to provide them with the capability.

Another substantial limitation involves our ability to directly support the Army and Marine Corps forces on the ground at night. A senior pentagon official has been quoted as saying, "Night close air support is doable," he said. "But it is very difficult. You really have to have your act together and the right systems."²⁰ Desert Storm operations probably went a long way toward convincing those both inside and outside the military establishment that we (all aviation forces) don't yet completely have our act together in this most arduous regime. While night air interdiction was a rousing success overall during the war against Iraq, the difficulties posed by night CAS were made painfully apparent and it once again proved to be a demanding, dangerous and controversial mission. Although night CAS was only necessary and attempted to a limited degree, we still had at least one unfortunate, well publicized incident when a number of Marines in a light armored vehicle were killed when hit by a Maverick missile from an aircraft trying to perform the mission.²¹



Not by any means is it the Navy alone that is wrestling with the difficult night CAS problem. The A-10 Thunderbolt is currently the primary aircraft used by the USAF for the mission, but it has only very limited night capability since it was not designed specifically for the night environment. Steps are presently underway within the Air Force to decide whether to upgrade the night capability of the A-10, shift the mission to night capable F-15E or F-16 aircraft, design a new night capable aircraft for the role or transfer the mission with its associated requirements and problems to the Army attack helicopter community, assuming the Army agrees to accept the role.²² Under any of the Air Force alternatives, the need for naval air assets to remain capable in this area stays the same since none of the options are in any way expected to replace current Navy capabilities.

DESERT STORM

The discussion so far has not yet clearly established either the Navy or Air Force as domineering in the ability to operate in the night arena. And we can not yet answer the question, does the Navy offer anything extra or anything more? A look at some of the more critical lessons learned in Desert Storm may help in that regard. There are indeed some valuable ones in my opinion, with geography very high on the priority list because of the dramatic affect it played on the Navy's power projection capability.

The sustained conduct of long range strikes against Iraq



from CVBGs operating in the Red Sea was certainly not in line with the traditional employment concept of carrier air power. The routine sortie length of between six and eight hours required in order to reach the target area and then return to the ship in the Red Sea clearly could not have been sustained with any degree of regularity, maybe not at all, without the massive amount of tanking support provided by the Air Force. Lack of such support would have left only the CVs operating in the Persian Gulf able to conduct offensively oriented strike sorties, which would have dramatically reduced the Navy participation in the air war, both day and night. A question that comes up is, should the limited participation of the night attack assets from the Carrier Battle Groups that was almost, but not quite experienced during the war in the Middle East be sufficient to prove that a need exists to redefine the role that the CVBG should be ready and expected to carry out in support of the operational commander during future conflicts?

One should be extremely careful in planning to fight those future wars using the geography of the Middle East as the only yardstick. Clearly, the lesson it taught us during the most recent conflict will only be applicable in the next one if Iraq is again the belligerent. As the potential for future conflicts takes on a more multi-polar appearance, future battlefields will in all likelihood be easier for the Navy to reach out and touch. It is hard to find a more difficult location anywhere in the world for the Navy to



project power against and sustain it using Navy assets alone than Iraq proved to be. It is equally as hard to find any other location that is more favorable for the employment of Air Force assets than was the case in the Middle East. The Air Force was truly blessed with superb air fields in Saudi Arabia, built just for that exact scenario and all were readily available, just waiting to be manned. In future operations, it will probably not be quite as hard for the Navy to operate as it was in Iraq, or quite as easy for the Air Force.

Planning for these possible military encounters with the expectation of having such superb Air Force facilities available would be just as unrealistic as planning to conduct a contingency operation and anticipating employment of only Navy assets. Something in between these two extremes is the more prudent planning option.

JOINT OPERATIONS

Military operations in Grenada, Panama and the Middle East should be clear evidence to us all that "Jointness" as a way of employing combat forces is truly in. Having witnessed the tremendous success enjoyed using this concept during both Just Cause and more recently in Desert Storm, there is no reason to suspect it won't remain the preferred option for the foreseeable future as well. This type of military war fighting strategy clearly is ideal for the employment of a Carrier Battle Group with its current mix of night capable



aircraft.

The "Joint" approach worked in Desert Storm and it can do a lot in the future to overcome some of the inherent limitations encountered when a CVBG and the embarked aircraft are employed alone. Two examples where it can play a significant role are in the ability of "joint" forces to vastly increase the total number of available night attack aircraft, and negate some of the individual aircraft factors such as overcoming the F/A-18's unrefueled combat radius limitations. On the other hand, if the evolving nature of the multi-polar world is also considered, the probability is about the same that future contingency operations will occur in a geographic location involving distances and force level requirements much more favorable to stand-alone CVBG operations.

The ideal scenario for Navy operations would probably be one similar to the situation in Vietnam during the 1960s where carriers could operate routinely within 100 miles of the coast and conduct strikes from that location with relative ease. A case like that would be perfect for the F/A-18 and not surprisingly, a geographic area/threat scenario which fits that description really does exist and is just as likely to be the next theater of action as Iraq.

Air Force squadrons possessing night attack capable aircraft will probably be necessary to the maximum extent they can contribute in every future case as well. Desert Storm proved that in order to absolutely minimize losses the



way we want to and to be clearly dominate in an area of operation (AOR), the very best assets from every available source, including allies, will quite often be necessary. This is true against all except the very smallest, weakest third world adversaries. Seldom will a single service, Navy or Air Force, be able to do it all alone. Under any of the above possible scenarios, it does not appear to be necessary, nor is today the right time to be looking to redefine the role of the Carrier Battle Group.

CONCLUSION

Since the very first time aircraft were used in support of ground forces, there has been a continuous effort to not only exploit the capability of air assets, but also to carve out and maintain a safe sanctuary from which to operate. As threat systems have improved, that sanctuary has evolved more and more into using the night, low altitude environment for the safe haven. Initially, only radar capable aircraft such as the A-6 or F-111 were able to operate in that regime with any significant degree of freedom or efficiency.

The development of new state-of-the-art technology which produced night attack capable platforms like the Navy F/A-18s and A-6s as well as Air Force F-15Es and F-16s, has truly opened up the air battle to where it can now actually be a 24 hour operation. Both the Air Force and Navy of today really have the capability to provide the operational theater commander with night air interdiction/power projection that



approaches day time accuracy and versatility.

The combined use of night vision goggles with state-of-the-art forward looking infrared systems incorporated in new production Navy aircraft is more flexible and provides an enhanced capability in many scenarios and environmental conditions than is currently available when compared with the Air Force FLIR only counterpart.

There were many lessons learned from Desert Storm, but not all can be applied to every future conflict. Geography made it very difficult for Navy CVBGs to carry out sustained power projection strikes against Iraq and while the same problems could surface again in future contingencies, the "joint" approach to war-fighting goes a long way toward minimizing some of the shortcomings in CVBG capabilities.

The next conflict may not find the Air Force blessed with the same excellent airfields it had right next door in Saudi Arabia during the most recent war. If it was forced to operate from fields far removed from the theater of action, their Global Power, Global Reach concept may experience sustainment and force concentration limitations similar to those the Navy faced in the war against Iraq.

The need to continue developments and improvements to the U.S. night power projection capability still exists and every theater commander-in-chief needs the flexibility to be able to call on both Navy and Air Force assets in all future night joint operations.



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